Progress Energy

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U.S. Nuclear Regulatory Commission
ATTN: NRC Document Control Desk
Washington, DC 20555

Serial: HNP-05-077
10 CFR 50.73

SHEARON HARRIS NUCLEAR POWER PLANT UNIT 1
DOCKET NO. 50-400/LICENSE NO. NPF-63
LICENSEE EVENT REPORT 2005-002-00

Ladies and Gentlemen:

The enclosed Licensee Event Report 2005-002-00 is submitted in accordance with 10 CFR 50.73. This report describes a manual reactor trip following trip of the "B" condensate pump motor. In accordance with 10 CFR 50.72, this was previously reported on May 1, 2005. Refer to Event Number 41654.

Please refer any questions regarding this submittal to Mr. Dave Corlett, Supervisor - Licensing/Regulatory Programs, at (919) 362-3137.

Sincerely,

BCWalp

B. C. Waldrep
Plant General Manager
Harris Nuclear Plant

BCW/sfm

Enclosure

c: Mr. R. A. Musser (HNP Senior NRC Resident)
Mr. C. P. Patel (NRC-NRR Project Manager)
Dr. W. D. Travers (NRC Regional Administrator, Region II)

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NRC FORM 366 (6-2004) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 06/30/2007

Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to Infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

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4. TITLE
Manual Reactor Trip Following a Trip of the "B" Condensate Pump Motor

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
									N/A	05000
05	01	2005	2005	- 002 -	00	06	30	2005	FACILITY NAME: N/A	DOCKET NUMBER: 05000

9. OPERATING MODE
1

10. POWER LEVEL
100

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: *(Check all that apply)*

- ☐ 20.2201(b)
- ☐ 20.2201(d)
- ☐ 20.2203(a)(1)
- ☐ 20.2203(a)(2)(i)
- ☐ 20.2203(a)(2)(ii)
- ☐ 20.2203(a)(2)(iii)
- ☐ 20.2203(a)(2)(iv)
- ☐ 20.2203(a)(2)(v)
- ☐ 20.2203(a)(2)(vi)
- ☐ 20.2203(a)(3)(i)
- ☐ 20.2203(a)(3)(ii)
- ☐ 20.2203(a)(4)
- ☐ 50.36(c)(1)(i)(A)
- ☐ 50.36(c)(1)(ii)(A)
- ☐ 50.36(c)(2)
- ☐ 50.46(a)(3)(ii)
- ☐ 50.73(a)(2)(i)(A)
- ☐ 50.73(a)(2)(i)(B)
- ☐ 50.73(a)(2)(i)(C)
- ☐ 50.73(a)(2)(ii)(A)
- ☐ 50.73(a)(2)(ii)(B)
- ☐ 50.73(a)(2)(iii)
- ☒ 50.73(a)(2)(iv)(A)
- ☐ 50.73(a)(2)(v)(A)
- ☐ 50.73(a)(2)(v)(B)
- ☐ 50.73(a)(2)(v)(C)
- ☐ 50.73(a)(2)(v)(D)
- ☐ 50.73(a)(2)(vii)
- ☐ 50.73(a)(2)(viii)(A)
- ☐ 50.73(a)(2)(viii)(B)
- ☐ 50.73(a)(2)(ix)(A)
- ☐ 50.73(a)(2)(x)
- ☐ 73.71(a)(4)
- ☐ 73.71(a)(5)
- ☐ OTHER

Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER (Include Area Code)
Dave Corlett – Licensing Supervisor	919-362-3137

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
B	SD	P	Siemens-Allis	Y					

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

On May 1, 2005 with the reactor at approx. 100% power, operators at the Harris Nuclear Plant (HNP) manually tripped the reactor in response to an automatic trip of an operating condensate pump (CP). The "B" CP tripped due to a motor shaft shear at the top of the motor coupling hub. By design, the trip of the "B" CP caused subsequent trips of the "B" condensate booster pump and the "B" main feedwater pump (MFP). As directed by plant procedures, the operators manually tripped the reactor upon the trip of a MFP with initial reactor power greater than 90%. The manual reactor trip coupled with the trip of the "B" condensate and feedwater (FW) train resulted in a reduction of steam generator (SG) water levels. The subsequent low-low SG levels resulted in an auto-start of the auxiliary FW pumps as designed. Safety systems functioned as required.

The cause of this unplanned trip was the loss of FW to the steam generators initiated by the motor shaft shear for the "B" CP. The root cause of the motor shaft shear is inadequate controls for a vendor weld repair.

Completed corrective actions include replacing the failed motor. Planned corrective actions include improving process controls for shaft weld repairs and subsequent non-destructive examination, improving seal installation techniques, establishing coupling inspection criteria, and improving monitoring capability of the CPs.

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17. NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)*

I. DESCRIPTION OF EVENT

On May, 1, 2005 at 0021 hours with the reactor at approximately 100% power, operators at the Harris Nuclear Plant (HNP) manually tripped the reactor as directed by plant procedures in response to an automatic trip of one of two operating condensate pumps (CPs) [SD-P]. The "B" CP tripped due to a motor shaft shear at the top of the motor coupling hub. The "B" CP motor is a 2000 HP, 6.9 KV motor manufactured by Siemens-Allis, model ANVW-OD.

As designed, the trip of the "B" CP resulted in subsequent trips of the "B" condensate booster pump (CBP) and the "B" main feedwater pump (MFP) [SJ-P]. The main turbine control circuitry [IT] sensed the trip of the "B" MFP and automatically reduced turbine power (i.e., a turbine runback). Approximately 10 seconds later, a manual reactor trip was initiated as directed by plant procedures. Plant procedures require immediate action to manually trip the reactor upon the trip of any MFP with initial reactor power greater than 90%. The manual reactor trip coupled with the trip of the "B" condensate and feedwater train resulted in a reduction of steam generator water levels. During a rapid load reduction, such as a turbine runback or a reactor trip, steam generator levels lower (shrink). The lowest steam generator levels were observed within about 1.5 minutes of the reactor trip with levels reaching approximately 15.7%, 22%, and 18.5% for the "A," "B," and "C" steam generators, respectively. Due to the low-low steam generator levels (i.e., less than 25%), both motor-driven auxiliary feedwater (AFW) pumps [BA-P] and the turbine-driven AFW pump auto-started as designed.

The operations crew responded to the event in accordance with applicable plant procedures, and the main control room staff stabilized plant conditions and recovered inventory in all three steam generators. Safety systems functioned as required during this event.

The HNP condensate and feedwater design includes two redundant trains each with a condensate pump, a condensate booster pump, and a main feedwater pump. The condensate pumps take suction from the main condenser hotwell. The discharge from both condensate pumps combine flow to the suction of both condensate booster pumps. The discharge of the condensate booster pumps flow through a series of feedwater heaters and combine with the discharge of the heater drain pumps to provide suction to the two main feedwater pumps. The main feedwater pumps discharge flow through two additional feedwater heaters, and then the flow is separated into three lines to provide inventory to the three steam generators. The HNP condensate and feedwater design results in a trip of the associated condensate booster pump and main feedwater pump when a condensate pump trips.

Energy Industry Identification System (EIIS) codes are identified in the text within brackets [ ].

II. CAUSE OF EVENT

The cause of this unplanned trip was expected operator actions in response to the loss of feedwater to the steam generators initiated by the motor shaft shear for the "B" CP. The motor shaft shear was caused by inadequate controls for a vendor weld repair of the drive end shaft of the motor in January 2000. The weld repair extended from the shaft coupling shoulder to the end of the shaft including the threaded portion for a lift adjusting nut. The shaft was then machined to dimensional specification. The non-destructive exams (NDE) included a volumetric surface exam prior to welding and a liquid penetrant surface exam after machining. The NDE performed after the weld repair was not adequate to identify the lack of weld fusion which was identified in the analysis of the shaft following the event.

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(1-2001)

LICENSEE EVENT REPORT (LER)

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17. NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)*

III. SAFETY SIGNIFICANCE

Other than the transient induced by the manual reactor trip, there were no safety significant consequences as a result of this event. The plant was manually tripped by control room operators as directed by plant procedures. The plant is designed for a loss of main feedwater, and it responded as expected for this condition. The loss of normal feedwater event is classified as an ANS Condition II event, a fault of moderate frequency (i.e., expected to occur, in general, no more than once per year). The initial plant conditions were well within the bounding conditions for the plant design. The event did not involve any release of radioactive material. No design safety limits were exceeded, and no fission product barriers or components were damaged as a result. The plant was promptly stabilized at normal operating no-load reactor coolant system temperature and pressure, and no unusual conditions were observed for plant equipment following the manual reactor trip. All safety equipment functioned as required. The operating staff performed all required actions for the trip.

The potential safety consequences under other alternate conditions, such as a loss of both MFPs, may have increased the severity of the transient and may have resulted in an automatic rather than manual reactor trip, but these alternate conditions would not have significantly increased the potential safety consequences of this event. In general, the severity of the plant transient is reduced at lower power levels, so the same event initiated at a lower power (i.e., less than 100% power) would be expected to result in a smaller transient. This report is submitted pursuant to 10CFR50.73(a)(2)(iv)(A) for the manual reactor trip and automatic actuation of the AFW system.

IV. CORRECTIVE ACTIONS

Completed corrective actions include replacing the failed motor. Planned corrective actions include improving process controls for shaft weld repairs and subsequent non-destructive examination, improving seal installation techniques, establishing coupling inspection criteria, and improving monitoring capability of the CPs.

V. PREVIOUS SIMILAR EVENTS

HNP LER 2003-005-00 (reported October 16, 2003)

The "A" CP motor failed on August 17, 2003 prompting an operator initiated manual reactor trip due to loss of feedwater. This event was investigated in non-conformance report AR-103182. The cause of this unplanned trip of the "A" CP motor was due to a lightning voltage surge that overcame the dielectric strength of the motor winding insulation (i.e., an electrical short). In addition, the grounding system was not effective at protecting the "A" CP motor from a lightning strike. Corrective actions included replacing the failed motor and installing surge protection. In addition, HNP enhanced the "A" CP grounding system and install surge protection on the "B" CP motor. Although the root cause for this previous event is significant in relation to the subject event, the previous corrective actions would not have prevented the event identified by this LER.

The INPO operating experience database and EPIX database were searched by pump and motor model number. Keyword searches were also conducted on shaft cracking. There was no OE identified that was directly applicable to the experienced failure and that would have prevented the event. This event was not a repeat failure.

VI. COMMITMENTS

This document contains no new regulatory commitments.